

Séminaire

Mardi 18 novembre 2025 à 10h30
Amphithéâtre Henri Benoît

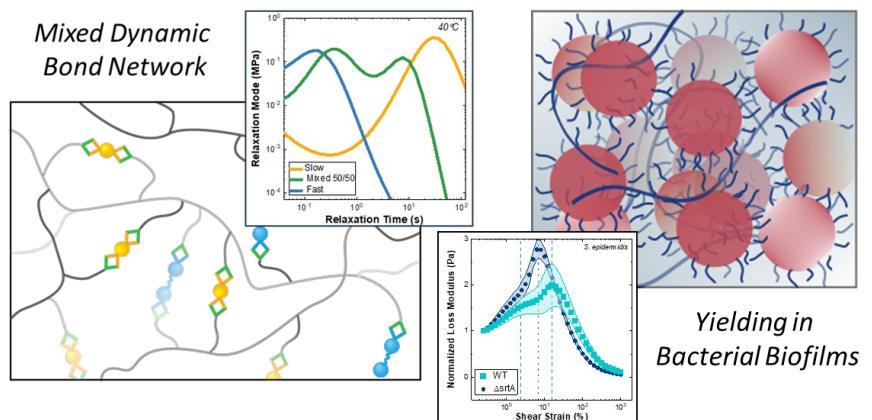
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Rheological Tunability of Self-Healing Polymers and Bacteria Biofilms

Soft materials with tunable rheological properties have applications from soft robotics, adhesives, 3D printing, and reusable plastics. The first part of the talk will focus on dynamic polymer networks (specifically vitrimers) which are exciting for their recyclability. By designing the polymer architecture of PDMS or polyacrylate vitrimers, the viscoelastic behavior was tuned when both fast and slow crosslinkers were mixed into a network. When the fast and slow crosslinkers (four orders of magnitude difference in relaxation time) were mixed in an end-crosslinked polymer network, a single relaxation time was observed, but two modes of relaxation were identified when the polymer was statistically crosslinked and could “feel” both the fast and slow bond exchange along a single polymer chain.

The second part of the talk will focus on the rheological tunability of *Staphylococcus epidermidis* biofilms via systematic gene deletion of biofilm adhesive components. The behavior of these spherical bacteria in their biofilm was found to be rheologically similar to colloidal gels, which can experience a double yielding phenomenon under shear strain. By using gene deletion and inhibition, we were able to deduce the microstructural mechanisms for the yielding behavior. Deletion of the *srtA* gene (related to the family of sortase enzymes) produced a biofilm with only single yielding. We found that the sortase A enzyme, which helps bind the bacterial cell wall to the polysaccharide biofilm matrix, could play a role in facilitating biofilm removal and limiting bacteria virulence. These two stories show how tunability in rheological properties can lead to materials design and broader applications for the field of soft matter.



Les personnes souhaitant rencontrer Laura Porath sont priées de prendre contact avec Joachim Wittmer.